APFISN

INVASIVES

Newsletter of the Asia-Pacific Forest Invasive Species Network (APFISN)

Volume 11 June - July 2007

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- 20-25 September 2007. International Workshop on Biological Control of Forest Invasive Species, Beijing, P. R. China
- 7-12 October 2007. Novel and Sustainable Weed Management in Arid and Semi-Arid Agro-Ecosystems, Hebrew University of Jerusalem, Rehovot, Israel
- 16-18 October 2007. The Future of Forests in Asia and the Pacific: Outlook for 2020, Chiang Mai, Thailand
- 27- 30 May 2008. Weeds Across Borders 2008, Banff, Alberta, Canada

The Asia-Pacific Forest Invasive Species Network (APFISN) has been established as a response to the immense costs and dangers posed by invasive species to the sustainable management of forests in the Asia-Pacific region. APFISN is a cooperative alliance of the 33 member countries in the Asia-Pacific Forestry Commission (APFC) - a statutory body of the Food and Agricultural Organization of the United Nations (FAO). The network focuses on inter-country cooperation that helps to detect, prevent, monitor, eradicate and/or control forest invasive species in the Asia-Pacific region. Specific objectives of the network are: 1) raise awareness of invasive species throughout the Asia-Pacific region; 2) define and develop organizational structures; 3) build capacity within member countries and 4) develop and share databases and information.

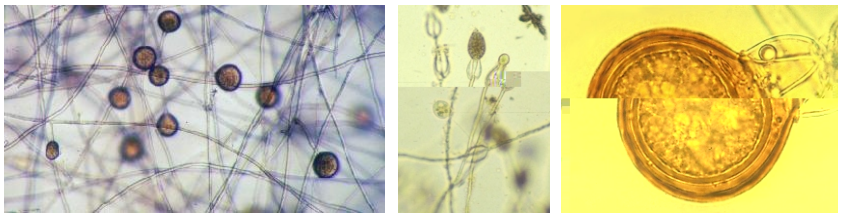
Pine trees affected by *Phytophthora cinnamomi*

Prosopis juliflora - a twig with flowers

INVASIVES, bimonthly newsletter of the Asia-Pacific Forest Invasive Species Network (AFPISN) is intended to share information among countries in the Asia-Pacific region on Forest Invasive Species(FIS) and the threats they pose in the region. If you have any items of news value on FIS to share between national focal points of APFISN and more widely among foresters, agriculturists, quarantine personnel and policy makers, please pass them on to the editor - Dr. K. V. Sankaran, APFISN Coordinator, Kerala Forest Research Institute, Peechi-680 653, Kerala , India (sankaran@kfri.org). The newsletter is supported by the Food and Agriculture Organization of the United Nations (FAO) and USDA Forest Service.

Phytophthora cinnamomi

Phytophthora cinnamomi is a destructive soil-borne fungal pathogen that infects woody plants worldwide. It is the most widely distributed species of *Phytophthora*, with over 1,000 host plants. No other soil-borne plant pathogen has had such a large impact worldwide and over such a large range of plant hosts as *P. cinnamomi.* It causes crown rot and root rot of many horticultural, ornamental and forestry crops. Plants susceptible to *P. cinnamomi* display a range of symptoms: some are killed; some are damaged, but endure; and some show no apparent symptoms. In some circumstances, the pathogen may contribute to plant death assisted by other stresses such as waterlogging, drought or wildfire. The geographic origin of the fungus has not been clearly established. It was first described on *Cinnamomum burmanii* in Sumatra, Indonesia, in 1922. The pathogen is found in tropical and subtropical regions, in the Mediterranean, and in some mild, temperate regions, where it has almost certainly been introduced. The fungus is reported to be indigenous to Southeast Asia, but has spread across the Australasia-Pacific region, Europe, North America and South Africa. Independent of the possible origin of the pathogen, it can be considered a threat due to the extensive movement and potential for movement as a result of human activities. The fungus has the potential to significantly alter the ecology of the affected vegetation types.



Phytophthora cinnamomi - chlamydospores, sporangia and mature oogonium

Phytophthora infection spreading to the stem

P. cinnamomi can survive long periods as a saprophyte. It spreads both by chlamydospores and by water-propelled, bi-flagellate, asexual zoospores. Chlamydospores are globose, thin-walled, tough, long-lived and resistant, and are mainly terminal in occurrence on the hyphae or in grape-like clusters. They are formed in soil, gravel or plant tissues, germinate under moist conditions, and form mycelia / sporangia or more chlamydospores. Mycelium of *P.cinnamomi* can survive at least 6 years in moist soils and zoospore cysts can survive at least 6 weeks. The sporangia release motile, short-lived, fragile zoospores into the soil water, which then swim to approach small roots, where they encyst and germinate on the root surface. Penetration occurs within 24 hours of germination. The fungus then spreads into the young feeder roots, causing rot which may extend into the base of the stem. The affected stem will produce brown lesions, which may result in bleeding trunk cankers (called “ink disease”). Propagules of the pathogen that come in contact with aerial parts of the plant can also cause infection. Affected plants will have chlorotic and wilted foliage and the branches will show die-back.

The plants affected by *P.cinnamomi* exhibit reduced fruit size and a general decline in yield. Exudation of gum, heart rot and collar rot are other symptoms of infection and trees exhibiting such symptoms will collapse in a short while. Although the larger roots are also attacked, the infection and rotting of feeder roots are lethal since the absorption of water and nutrients is affected. The fungus can produce sexual spores called oospores even under unfavorable conditions. These are capable of surviving for extended periods of time, and when conditions become favorable can germinate and renew the lifecycle. Different germination periods may help to maintain a low, but continuing, population of the fungus in the soil. Infection by *P.cinnamomi* can also occur together with infection by other *Phytophthora* species. Root to root contact is one of the main pathways of disease spread.

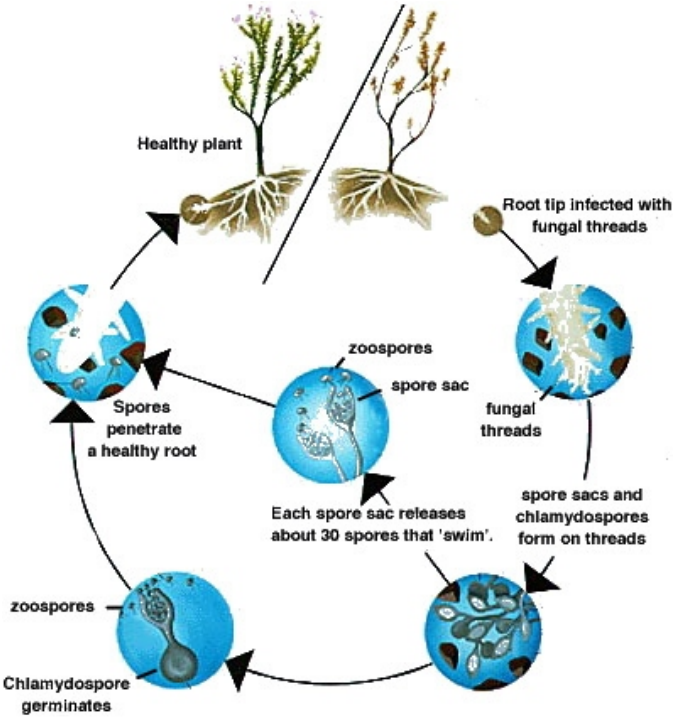
The pathogen commonly occurs in disturbed areas, natural forests, range / grasslands and scrub / shrub lands. Temperature, pH and moisture are the major factors influencing its growth and reproduction. Dispersal of the fungus happens through soil splash, wind blown soil or debris, water currents, run-off in drainage / irrigation ditches, movement of machinery or vehicles, contaminated soil, road gravel, plant debris, container-grown ornamentals and animals. There is no airborne transmission. Moist soils and warm temperatures are pre-requisites for active infection by the fungus, but the most severe damage usually appears in summer when trees are water-stressed. Infection by *P. cinnamomi* is severe in soils with poor drainage, high clay content and high water tables.

The major tree species affected by *P. cinnamomi* are *Eucalyptus* (especially *E. marginata* or jarrah), *Fagus*, *Juglans*, *Pinus*, *Prunus*, *Quercus* (oaks), conifers, members of Ericaceae (including *Rhododendron*) and many ornamental trees and shrubs. It has caused extensive damage to natural eucalypt trees in Australia. An estimated 2,000 of the 9,000 plant

Death of Pine seedlings due to *Phytophthora* infection

species indigenous to southwest Western Australia are susceptible to this pathogen, The most significant food crop loss due to the pathogen is in avocado in the USA, Australia and South Africa. The pathogen also attacks trees such as *Ananas comosus* (pineapple), *Castanea dentata* and

Life cycle of *Phytophthora cinnamomi*



C. sativa (chestnut). Its host range also includes most of the temperate fruit trees. In Tasmania, 181 plant species are recorded as hosts of *P. cinnamomi*, and at least 39 of the threatened plant species are susceptible to the fungus. Animals affected by loss of habitat due to *P.cinnamomi* infection include Southern Brown Bandicoot, Smoky Mouse, Eastern Bristlebird and Eastern Ground Parrot in Australia. There are several plant communities that are adversely affected by the pathogen, either due to direct infestation or degradation of the habitat.

Controlling the pathogen is complicated by the very wide host range, as well as the longevity of the propagules (mainly sporangia and encysted zoospores) in non-sterile moist soil and root debris. Infected plants that exhibit no symptoms are a major means of spreading this pathogen to disease-free areas. The first line of control is, therefore, planting disease-

Eucalyptus marginata trees killed by *P. cinnamomi* in W. Australia

free stock. Cultural control measures include alleviation of high soil moisture levels and improving aeration by increasing drainage, and attention to mineral nutrition. Elements of the soil microflora suppress *P.cinnamomi* in some soils due to the presence of potential biocontrol agents. Chemical control is possible with systemic fungicides, particularly fosetyl-aluminium, etridiazole, etridiazole plus thiophanate methyl and metalaxyl, applied as soil drench, foliar spray or trunk injection. Elemental sulfur reduced the incidence of this disease in pineapple, apparently through effects on soil pH. In Portugal, a significant improvement in the vegetative growth of holm (*Ilex* spp.) and cork oaks injected with potassium phosphonate has been reported. Hygienic precautions can be applied to exclude the pathogen from becoming established. Unsterilized soil / growing medium, farm machinery and introduced plants should be checked thoroughly for contamination by the fungus.

Prevention of introduction is the most viable option to check the spread of *P. cinnamomi.* Eucalypt plantations in most countries in South and Southeast Asia are currently free from *Phytophthora* root rot. Extreme care is warranted to exclude this pathogen while importing seed lots / seedlings.

Mesquite (*Prosopis juliflora*)

Prosopis juliflora (Mesquite), a native of North, South and Central America, is a spiny, fast-growing, small- to medium-sized evergreen or deciduous tree with a short, crooked trunk and a large crown. It is highly regarded as a fuelwood source in many tropical countries. Prosopis occurs worldwide (in 52 countries) with wide distribution in South America, Africa, South and Southeast Asia and Australia. It is a multi-purpose tree used for timber, fuelwood, charcoal, animal feed, human food, medicinal purposes and also for reclamation of wastelands and sand dunes. The species is tough, resilient and adaptable to all frost-free climatic regions. It will coppice, pollard and regenerate rapidly and is suited to a wide range of sites and soil types. The weedy nature of Prosopis has been reported from many countries including Argentina,

Prosopis infestation

Pods of *Prosopis juliflora*

Australia, India, Sri Lanka, Pakistan, Philippines, South Africa and Sudan. The tree was introduced in to South Asia in the late 1800s, either for land reclamation or as a source of fuelwood. However, its economic potential and other positive traits have increasingly been overshadowed by certain undesirable properties like weedy growth.

Mesquite grows up to 12 meters in height, with a trunk up to 1.2 meters in diameter, armed with stout, yellowish, nearly straight spines arising in pairs on both sides of the nodes and branches. The thick bark is brown or blackish in color and shallowly fissured. The leaves are compound, dark green, and commonly occur in more than 9 pairs. The leaflets are generally 5-10 mm long, linear-oblong in shape, glabrous, often hairy, and rounded at the apex. Flowers are greenish-yellow, sweet scented and spike-like. The calyx is 1.5 mm wide with hooded teeth. The corolla is deeply lobate and composed of five petals. The plant has a deep tap root system. Flowering begins at the age of 3-4 years. The flowers are cross pollinated by wind and insects. Pods are straight, linear, falcate to annular, with one to several segments, 10-25 cm long, brown or yellowish in color and contain 10-30 seeds. They are compressed when young, thick at maturity, and more or less constricted between the seeds. The seeds are dark brown, hard and ovoid with a mucilaginous endosperm surrounding the embryo. The seeds retained within intact pods can remain viable for up to 40 years, but exposed seeds dry and decay rapidly. Animals favor the pods and a large percentage of the seeds remain viable after passing through the animal's digestive tract. Dissemination through cattle dung is one of the major pathways for invasion. The seeds germinate at between 20-40° C and have high germinability. Mesquite pods are among the earliest known foods of prehistoric man in the New World.

Seeds of *Prosopis*

The habitats of Prosopis include abandoned agricultural lands, wastelands, degraded lands, deserts and grasslands. Mesquite is capable of growing on sandy and rocky areas, on medium to fine textured soils in semi-arid and arid regions, on saline soils, acid to alkaline soils and in seasonally water-logged areas where other tree species have failed. The tree can grow well at 14-34° C in areas with an annual rainfall of 50-1,200 mm, and at altitudes up to 1,500 m. It grows gregariously in its preferred habitats, forming dense, impenetrable thickets. Thickets of Prosopis can also be found in grazing lands, crop lands and along river courses, which alarms pastoralists, farmers and conservationists. There is concern about the impact of the tree on the biodiversity of native plants and on the amount of water in dryland streams. The carrying capacity of many habitats has been seriously reduced due to the spread of the species. The tree can dry out the soil and compete with grasses for water, especially in dry areas. Its wood is well known for its high calorific value, slow burning properties and for the capacity to hold heat well. The pollen of the species may cause allergic reactions for some people (e.g., rhinitis, bronchial asthma and hypersensitivity pneumonitis). Mesquite poisoning may induce a permanent impairment of the ability to digest cellulose.

In several parts of India, farmers find it more profitable to allow the growth and colonization of Prosopis in their drylands, compared to cultivating cereals and millets. The trees are allowed to grow for a few years and are then converted to charcoal, thus contributing significantly to the socio-economic situation in the region. Apart from providing a means to contribute to the farmers' livelihoods, Prosopis also meets their demands for fuelwood.

Programmes to eradicate Prosopis have been attempted in several countries through chemical and mechanical methods, but have proved largely unsuccessful. Since cutting promotes regeneration, mechanical methods of control cannot be recommended. Like *Leucaena*, inter-specific hybridisation with a closely related species, e.g., *Prosopis pallida*, is common and it challenges attempts at biocontrol. One reliable method of control is thinning and pruning of seedlings to less dense spacings. While this can promote growth of Prosopis, it also increases soil fertility through nitrogen fixing and decomposition of nitrogen rich litter. The increased growth of the ground cover (indigenous species) discourages or reduces the establishment of Prosopis seedlings. Cattle should be prevented from grazing in Prosopis-infested areas when trees bear pods, since they may aid in the dispersal of seeds. The removal of creeping root systems also prevents re-growth. Another method of control is to remove old growth by cutting and then prevent re-growth by treating the basal bark with herbicides. Winter burning has been used to

Prosopis juliflora - mature trees

control young trees. A combination of herbicide treatment and fire may be effective for both controlling and removing dead woody material. Biological control using seed-feeding bruchid beetles viz., *Neltumius arizonensis, Algarobius prosopis* and *A. bottimeri*, introduced from North America, has been attempted in South Africa.

The eradication of mesquite is not an easy task. Therefore, the adoption of suitable management and control techniques that can convert weedy stands into productive, profitable and sustainable agroforestry systems is worth attempting. Accidental introduction of Prosopis to newer areas may be blocked by implementing strict quarantine measures.

Algarobius prosopis

Neltumius arizonensis

News column

WSSA announces new journal - Invasive Plant Science and Management

The Weed Science Society of America (WSSA) has announced the publication of a new journal with the working title, Invasive Plant Science and Management. The journal will publish peer-reviewed research on invasive plants, including reviews centered on management and biology / ecology restoration, and aims to be readily accessible to land management practitioners and scientists working on invasive plants. Articles will also include peer-reviewed case studies of land management programs. The journal will be issued quarterly and will be available in print and on-line versions. Contact: Janet Clark, Project Manager (406-994-6832) or jmditomaso@ucdavis.edu ; or visit: www.wsweedscience.org / newsletter

Environmental weeds of Australia -an information and identification tool on DVD-ROM.

The Environmental Weeds of Australia DVD-ROM is a comprehensive identification tool for weeds in Australia. It provides detailed descriptions of the major environmental weeds of Australia, as well as accurate and up-to-date information about the current and potential impacts, distribution, and reproduction and dispersal mechanisms of these species. Links to sites with more information on the management of these species are included, along with notes on how to distinguish weeds from native species that they might be confused with. There is a detailed glossary, a search function and several high quality photographs for each species. This resource will be of significant benefit to those managing environmental weeds in Australia. It is also a valuable teaching resource for students and the wider community (e.g., bush care and land care volunteers, state and local pest plant officers, etc.). The DVD includes more than 1,000 species, about 300 of which are covered in great detail. Contact: Dr Sheldon Navie A / Prof. or Steve Adkins, 07 3365 4813 or 07 3365 2072;s.navie@uq.edu.au ; s.adkins@mailbox.uq.edu.au; www.cbit.uq.edu.au

Weed seed wizard - a weapon against weeds

Known as the Weed Seed Wizard, this interactive, computer-based system reveals the hidden weed seed bank and helps growers coordinate long-term weed management. And, it comes with a sober warning: no matter how many weed plants you kill this year, there will always be seeds hidden in the soil ready to spring to life to cut yields and reduce profits. The Wizard's features include the ability to: simulate important interactions between weather, paddock management and seed biology; predict characteristics of seeds in the soil (e.g., numbers, ages, soil depths, dormancy levels etc); and warn of potential weed problems by predicting hidden reserves. It targets major crop weeds of Australia, including annual ryegrass, wild oats and flax leaf fleabane. The Wizard is still in development, but is available for trial from the Weeds CRC website. Growers can download the Wizard, simulate their paddock or weed trials and send feedback via the website. Contact: Michael Renton and Jenny Barker, www.weeds.crc.org.au / projects / project_2_3_3_1.html(Volume 2, July 2007)

The Pacific Invasives Learning Network (PILN)

Invasives are a priority for Pacific Island nations, because islands are highly vulnerable to invasions that can result in catastrophic loss of biodiversity and other impacts. However, the relatively small size and isolation of most islands offer important opportunities for preventing new invasions and eradicating

existing pest species. In some parts of the Pacific, experienced conservation professionals have developed model programs to prevent, eradicate, or control certain high-priority invaders, such as rodents, feral animals, and invasive weeds. However, according to the Global Invasive Species Programme, "In most Pacific Island countries, there is a profound lack of awareness about the issue and an almost complete absence of capacity to deal with invasive species." Conservation practitioners in the Pacific represent a host of different agencies and countries, and most are geographically and professionally isolated. As a result, few Pacific conservationists currently have the information, expertise, and support they need to manage invasive species effectively.

Peer learning networks are a proven strategy for improving conservation skills and building cooperation between trained professionals. By bringing peers together with conservation experts, learning networks can foster new ideas and practical, site-specific solutions. Multi-disciplinary project teams can work together on strategies with critical input from other teams and experts, resulting in a common vision and a plan for effective conservation action.

In 2005, The Nature Conservancy joined with the Secretariat of the Pacific Regional Environment Programme, the Cooperative Island Initiative on Invasive Species, IUCN's Invasive Species Specialist Group, the National Park of American Samoa, Conservation International, the Palau Office of Environmental Response and Coordination, the University of the South Pacific, USDA Forest Service, and the Secretariat of the Pacific Community to establish the Pacific Invasives Learning Network (PILN). Collaborating closely with the initiative are the National Park of American Samoa and the Pacific Invasives Initiative.

The network serves teams of Pacific Island agencies responsible for invasives management, including agencies responsible for agriculture, international trade and other economic interests, as well as conservation and natural resource management. Its mission is to empower effective invasive species management through a participant-driven network that meets priority needs, rapidly shares skills and resources, provides links to technical expertise, increases information exchange, and accelerates on-the-ground action.

The founding teams come from all over the Pacific region, with representatives from all three sub-regions, Melanesia, Micronesia and Polynesia, and include members with a long-term commitment to conservation, having strong cultural understanding and the potential to act as innovators to increase invasive species management and prevention in their nations. Participating teams determine the specific invasive species issues that they will address using the network. PILN's activities and agenda are determined by the individual and shared needs of the participants. The official launch of the network and first annual meeting took place 22-26 May 2006, hosted by Palau. Members of the initial group of six founding teams from American Samoa, Guam, Niue, Palau, Pohnpei and Samoa participated in the meeting, together with Critical Ecosystem Partnership Fund grantees working on invasive species management demonstration projects from Palau, Samoa, the Federated States of Micronesia (Yap, Chuuk, Pohnpei, Kosrae), the Cook Islands, Fiji, French Polynesia, and representatives of eight partners and two close collaborators.

In 2007, new teams will be incorporated into the network, including French Polynesia, Hawaii, Kiribati, Kosrae, Marshall Islands, New Caledonia and Yap. Capacity building activities will focus on public awareness, strategic planning and rodent management, together with skill sharing exchanges to advance priority invasive species activities in participating countries.

APFISN Workshop on Developing Invasive Species Management Plans (8-10 May, 2007, Kuala Lumpur, Malaysia)

Recommendations

The Asia-Pacific Forest Invasive Species Network (APFISN) organized a workshop on Developing Invasive Species Management Plans, 8-10 May 2007, in Kuala Lumpur, Malaysia. The workshop was jointly sponsored by the USDA Forest Service, the Food and Agriculture Organization of the United Nations (FAO) and the Asia-Pacific Association of Forest Research Institutions (APAFRI). The main objectives of the workshop were to: 1) identify key components of an overall forest invasive species (FIS) biosecurity strategy to mitigate the risk of entry, establishment and spread of FIS in the Asia-Pacific region for all members to use as a guideline to direct activities; 2) identify efficient and effective methods for prevention of new incursions of FIS, especially through implementing effective quarantine measures and various appropriate codes of practice and “best practice” procedures and an action plan to progress; and 3) Develop an action plan and identify and develop key elements to enhance the capacity and capability for early detection and rapid response to mitigate the impact of FIS in the region.

Thirty-one participants (including 9 resource persons) from 16 countries attended the workshop. The main recommendations of the workshop were as follows:

1. APFISN should continue efforts to create awareness and improve basic knowledge on forest invasive species (FIS) among the public, policy makers and Government officials in the region through the use of publicity tools such as press releases, fact sheets, briefing papers, videos and publish success stories of FIS control.

2. Develop a database on FIS, compile country reports, prepare pest lists, prioritize and produce target lists and share information; map current regional activities to control FIS, identify gaps and resource opportunities; develop coordination and communication strategies for the region and implement them.

3. Pool and link taxonomic and other expertise in the region; develop links between quarantine-agriculture-forestry; facilitate risk analysis; help improve capacity in quarantine methods, early detection, pest risk assessment, forest health surveillance and diagnostics.

4. Link the network with IPPC, CBD, APEC, ASEAN and OIE; share information with other FIS networks; identify a regional leadership for forest health issues; advocate and arrange appropriate input in various bodies; raise the "Forestry profile" in each country through policy makers - with the help of the APFC.

5. Develop regional strategies for risk analysis, pest surveillance, pest management and germplasm handling; help countries to access diagnostic resources.

New publications

Okamoto, H., Murata,T., Kataoka, T. and Shun-Ichi Hata. 2007. Plant classification for weed detection using hyperspectral imaging with wavelet analysis. Weed Biology and Management, 7:31-37.

Shoji, K. 2007. Development of a spot plow providing complete inversion for effective weed control. Weed Biology and Management, 7:14-22.

Eppstein, M.J. and J. Molofsky. 2007. Invasiveness in plant communities with feedbacks. Ecology Letters, 10:253-263.

Taneda, H. and M. Tateno. 2007. Effects of transverse movement of water in xylem on patterns of water transport within current-year shoots of kudzu vine, *Pueraria lobata*. Functional Ecology, 21:226-234.

Recent Books

Fundamentals of Weed Science (Third edition): By Robert Zimdahl, published by Elsevier, 2007. This book addresses herbicides and their use as an important aspect of modern weed management, and strives to place them in an ecological framework. Many weed scientists believe that agriculture is a continuing struggle with weeds - without good weed control, good and profitable agriculture is impossible. Each agricultural discipline sees itself as central to agriculture's success and continued progress, and weed science is no exception. While not denying the importance of weed management to successful agriculture, this book places it in a larger ecological context. The roles of culture, economics, and politics in weed management are also discussed, enabling scientists and students to understand the larger effects on society.

Invasive Plants and Forest Ecosystems. Eds. Ravinder Kumar Kohli, Shibu Jose, Harminder Pal Singh, and Daizy Rani Batish, published by CRC Press, 2007. Invasive non-native species pose one of the greatest challenges for natural resource managers who are charged with the maintenance of biological diversity and the sustainable production of forest resources. With international contributors presenting an informed and integrated approach to the control of havoc-wrecking species, this book provides the most updated information on invading plants, their impacts on forest ecosystems, and control strategies. It also addresses such important issues as the socioeconomic and policy aspects of plant invasion and offers complete coverage of their ecological impacts and the varied levels of threats in diverse situations.

Forthcoming Symposia / Workshops

20-25 September 2007. International Workshop on Biological Control of Forest Invasive Species, Beijing, P. R. China. This workshop is being organized by the Chinese Forestry Administration in collaboration with the USDA Forest Service, APFC, FAO and the Asia-Pacific Forest Invasive Species Network The main objectives of the workshop are: 1) to summarize the most recent regional collaborations in managing forest invasive species; 2) to develop a plan for future collaborations between the USDA Forest Service and various organizations in China, as well as other Asia-Pacific countries in managing forest invasive species; 3) to develop / strengthen strategies for minimizing the introduction of forest invasive species among the countries in the region; 4) to provide a platform for exchanging and sharing of experiences and information on biological control of forest invasive species; 5) to harmonize the procedures for the shipment of natural enemies (biological control agents); and 6) to document the biology, life history, natural enemies (biological control agents), etc., for a prioritized list of potential forest invasive species. Contact: Yun Wu at ywu@fs.fed.us

7-12 October 2007. Novel and Sustainable Weed Management in Arid and Semi-Arid Agro-Ecosystems, Hebrew University of Jerusalem, Rehovot, Israel. The Conference will focus on: 1) weed management in arid and semi-arid farming systems, dryland crops and irrigated crops; 2) bio-control and allelopathy in weed management; 3) integrated weed management and precision agriculture; 4) parasitic weeds; 5) herbicide resistant weeds and crops; 6) herbicide behavior in soils-bio-remediation and methyl bromide alternatives; 7) invasive weeds: biology, control and quarantine regulations; 8) weed biology and ecology and modeling; 9) biotechnology and molecular biology in weed science; and 10) application of methods and formulations. Contact : Prof. Baruch Rubin (rubin@agri.huji.ac.il)

16-18 October 2007. The Future of Forests in Asia and the Pacific: Outlook for 2020, Chiang Mai, Thailand. The Asia-Pacific Forestry Commission, in partnership with member countries and other international organizations, is conducting the second Asia-Pacific Forestry Sector Outlook Study (APFSOS II). This major international conference is being organized to strengthen the consultative and capacity-building processes of APFSOS II by bringing together diverse stakeholders and expertise to provide broader perspectives on emerging changes, probable scenarios and their implications for forests and forestry in the region. The main discussion areas are: 1) the current situation of Asia-Pacific forests and forestry; 2) societal transition in Asia and the Pacific and probable scenarios for forests and forestry; 3) the impacts of globalization on forests and forestry in Asia andthe Pacific; 4) challenges in balancing environmental, economic and social needs; and 5) policy, institutional and technological adaptations for the 21st Century. Contact: Mr. Patrick Durst (patrick.durst@fao.org)

27- 30 May 2008. Weeds Across Borders 2008, Banff, Alberta, Canada. The goal of this conference is to provide a forum for educating, sharing and disseminating knowledge about weed management, regulatory issues and concerns about weed dispersal across and between all jurisdictional boundaries in Mexico, Canada and the United States. Contact: aipc.coordinator@gmail.com

Compiled and edited by Dr. K. V. Sankaran, APFISN Co-ordinator on behalf of the Asia-Pacific Forest Invasive Species Network. For more information on the APFISN, please contact your national focal point or the APFISN Co-ordinator or Mr. Patrick Durst, Senior Forestry Officer, FAO Regional Office for Asia and the Pacific, 39 Phra Atit Road, Bangkok. Email: patrick.durst@fao.org